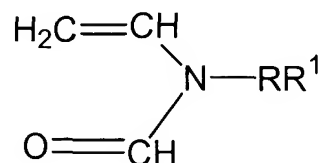


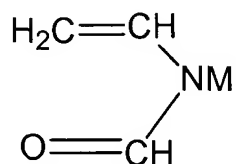
WHAT IS CLAIMED IS:

1. A method of synthesizing a compound having the formula:



comprising the step of:

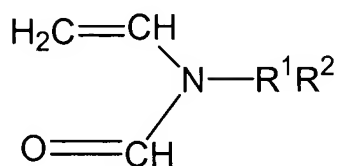
reacting a N-vinylformamide salt having the formula



with a compound having the formula  $\text{XRR}^1$ ; wherein X is Br, Cl or I, M is an alkali metal or an alkali earth metal,  $\text{R}^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $\text{R}^2$  is H, provided  $\text{R}^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-\text{OR}^3$ , wherein,  $\text{R}^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-\text{C}(\text{O})\text{R}^4$ ,  $-\text{C}(\text{O})\text{OR}^4$ ,  $-\text{OC}(\text{O})\text{R}^4$ , wherein  $\text{R}^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $\text{NR}^5\text{R}^5$  wherein  $\text{R}^5$  and  $\text{R}^5$  are independently H,  $-\text{C}(\text{O})\text{R}^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

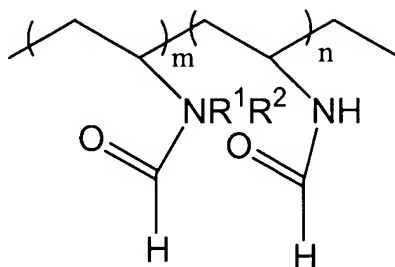
2. The method of claim 1 wherein the N-vinylformamide salt is formed by reacting an alkali metal base or an alkali earth metal base with N-vinylformamide.
3. The method of claim 2 wherein the alkali metal base is *t*-BuOK and the N-vinylformamide salt is N-vinylformamide potassium salt.
4. The method of claim 1 wherein X is Br.
5. The method of claim 1 wherein  $\text{R}^1$  is a C1-C10 alkylene group.
6. The method of claim 1 wherein  $\text{R}^2$  is a C1-C10 alkyl group.

7. The method of claim 1 wherein  $R^1$  is a C1-C10 perfluoroalkylene group.
8. The method of claim 1 wherein  $R^2$  is a C1-C10 perfluoroalkyl group.
9. The method of claim 1 wherein  $R^2$  is a phthalimide group.
10. The method of claim 1 wherein M is K or Na.
11. A method of synthesizing a copolymer comprising the step of reacting a compound having the formula:



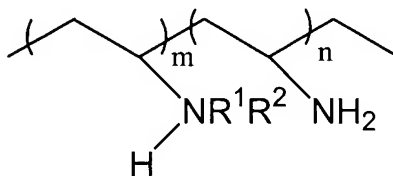
with at least one vinyl compound having at least one vinyl group, wherein  $R^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $R^2$  is H, provided  $R^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-\text{OR}^3$ , wherein,  $R^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-\text{C}(\text{O})\text{R}^4$ ,  $-\text{C}(\text{O})\text{OR}^4$ ,  $-\text{OC}(\text{O})\text{R}^4$ , wherein  $R^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $\text{NR}^5\text{R}^5$  wherein  $R^5$  and  $R^5$  are independently H,  $-\text{C}(\text{O})\text{R}^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

12. The method of claim 11 wherein the vinyl compound is N-vinylformamide.
13. The method of Claim 12 wherein the copolymer includes the following repeat units:



wherein m and n are integers.

14. The method of claim 13 further comprising the step of hydrolizing the copolymer to form a copolymer having the repeat units:

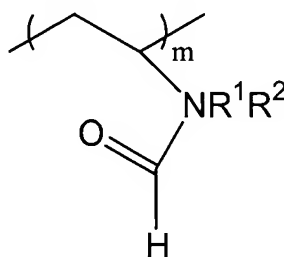


15. The method of Claim 14 wherein the hydrolysis occurs in acidic or basic conditions.

16. The method of claim 11 wherein the vinyl compound has the formula  $\text{CH}_2=\text{CH}-\text{R}^6$ , wherein  $\text{R}^6$  is  $-\text{OC}(\text{O})-\text{CH}_3$ ,  $-\text{C}(\text{O})-\text{O}-\text{R}^7$ , wherein  $\text{R}^7$  is an alkyl group, or  $-\text{C}(\text{O})\text{OH}$ .

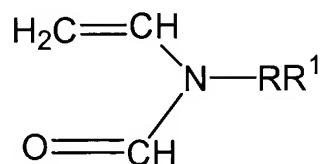
17. The method of claim 16 wherein  $\text{R}^7$  is a methyl group.

18. A polymer having the formula:

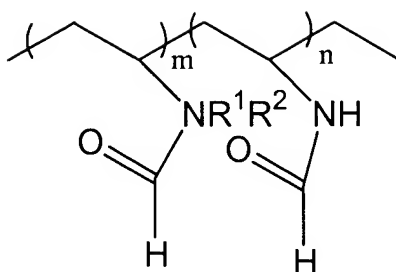


wherein  $m$  is an integer,  $\text{R}^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $\text{R}^2$  is H, provided  $\text{R}^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-\text{OR}^3$ , wherein,  $\text{R}^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-\text{C}(\text{O})\text{R}^4$ ,  $-\text{C}(\text{O})\text{OR}^4$ ,  $-\text{OC}(\text{O})\text{R}^4$ , wherein  $\text{R}^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $\text{NR}^5\text{R}^5$  wherein  $\text{R}^5$  and  $\text{R}^5$  are independently H,  $-\text{C}(\text{O})\text{R}^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

19. A copolymer produced by reaction of a compound having the formula:

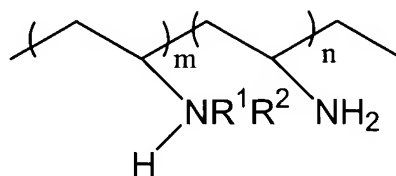


with N-vinylformamide, wherein the copolymer includes the following repeat units:

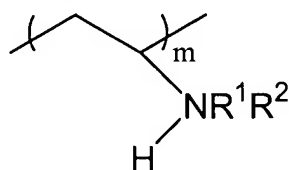


and wherein m and n are independently, integers,  $R^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $R^2$  is H, provided  $R^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-OR^3$ , wherein,  $R^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-C(O)R^4$ ,  $-C(O)OR^4$ ,  $-OC(O)R^4$ , wherein  $R^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $NR^5R^5$  wherein  $R^5$  and  $R^5$  are independently H,  $-C(O)R^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

20. The copolymer of Claim 18 wherein the copolymer is hydrolyzed to from a copolymer with the repeat units:



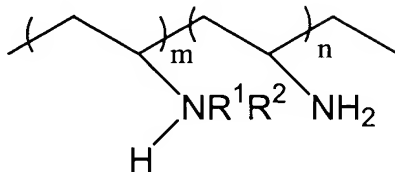
21. A polymer having the formula:



wherein m is an integer,  $R^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $R^2$  is H, provided  $R^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-OR^3$ , wherein,  $R^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-C(O)R^4$ ,  $-C(O)OR^4$ ,  $-OC(O)R^4$ , wherein  $R^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $NR^5R^5$

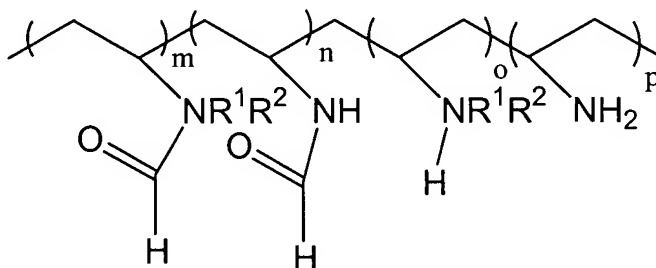
wherein  $R^5$  and  $R^5$  are independently H,  $-C(O)R^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

22. A polymer having the formula:



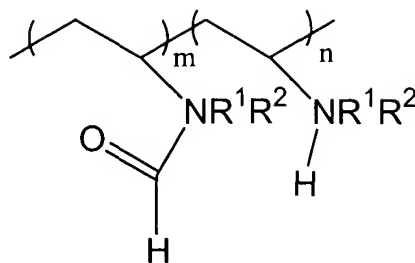
wherein  $m$  is an integer,  $R^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $R^2$  is H, provided  $R^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-OR^3$ , wherein,  $R^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-C(O)R^4$ ,  $-C(O)OR^4$ ,  $-OC(O)R^4$ , wherein  $R^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $NR^5R^5$  wherein  $R^5$  and  $R^5$  are independently H,  $-C(O)R^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group, the polymer having end groups that are either .

23. A random copolymer including the following repeat units:



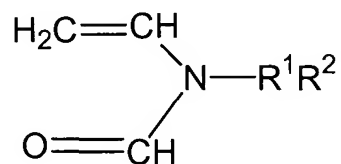
and wherein  $m$ ,  $n$ ,  $o$  and  $p$  are independently, integers,  $R^1$  is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group,  $R^2$  is H, provided  $R^1$  is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S,  $-OR^3$ , wherein,  $R^3$  is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group,  $-C(O)R^4$ ,  $-C(O)OR^4$ ,  $-OC(O)R^4$ , wherein  $R^4$  is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or  $NR^5R^5$  wherein  $R^5$  and  $R^5$  are independently H,  $-C(O)R^4$ , an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

24. A polymer including the following repeat units:



and wherein m and n are independently, integers, R<sup>1</sup> is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group, R<sup>2</sup> is H, provided R<sup>1</sup> is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S, -OR<sup>3</sup>, wherein, R<sup>3</sup> is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, -C(O)R<sup>4</sup>, -C(O)OR<sup>4</sup>, -OC(O)R<sup>4</sup>, wherein R<sup>4</sup> is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or NR<sup>5</sup>R<sup>5</sup> wherein R<sup>5</sup> and R<sup>5</sup> are independently H, -C(O)R<sup>4</sup>, an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

25. A compound having the formula:



wherein R<sup>1</sup> is a C0-C25 alkylene group, a C0-C25 fluoroalkylene group or a C0-C25 perfluoro alkylene group, R<sup>2</sup> is H, provided R<sup>1</sup> is not absent, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, an aryl group, a hydroxy group, a polyether group, a heterocyclic group of 5 or 6 atoms wherein at least one of the atoms is not a carbon and is N, O, or S, -OR<sup>3</sup>, wherein, R<sup>3</sup> is an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, -C(O)R<sup>4</sup>, -C(O)OR<sup>4</sup>, -OC(O)R<sup>4</sup>, wherein R<sup>4</sup> is an H, an alkyl group, a fluoroalkyl group, a perfluoroalkyl group, or an aryl group, a phthalimide group or NR<sup>5</sup>R<sup>5</sup> wherein R<sup>5</sup> and R<sup>5</sup> are independently H, -C(O)R<sup>4</sup>, an alkyl, a fluoroalkyl group, a perfluoroalkyl group or an aryl group.

26. The compound of claim 25 wherein X is Br.

27. The compound of claim 25 wherein R<sup>1</sup> is a C1-C10 alkylene group.

28. The compound of claim 25 wherein R<sup>2</sup> is a C1-C10 alkyl group.

29. The compound of claim 25 wherein  $R^1$  is a C1-C10 perfluoroalkylene group.
30. The compound of claim 25 wherein  $R^2$  is a C1-C10 perfluoroalkyl group.
31. The compound of claim 25 wherein  $R^2$  is a phthalimide group.